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# NAVAL POSTGRADUATE SCHOOL

Monterey, California



## THESIS

DEPRECIATION REQUIREMENTS IN THE  
DEPARTMENT OF DEFENSE

by

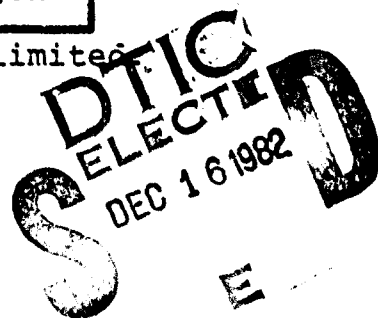
John R. Pipho

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Depreciation Requirements in the Department of Defense

by

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Captain, United States Marine Corps  
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Submitted in partial fulfillment of the  
requirements for the degree of

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from the

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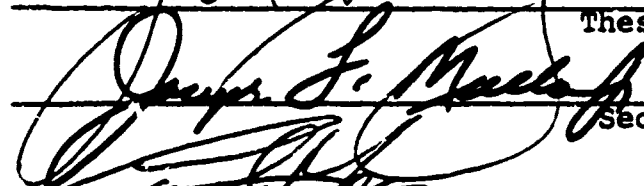
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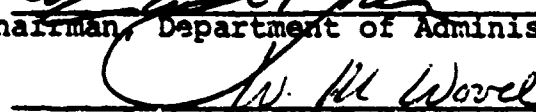


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### ABSTRACT

Government agencies are required by law to use an accrual basis of accounting in accordance with the principles and standards prescribed by the Comptroller General. One of these principles is to account for depreciation. The purpose of this study was to investigate the relevance of depreciation in the Federal government, especially in the Department of Defense. This was accomplished through literature research and personal interviews. The author concludes that, while depreciation may have some relevancy in the area of reimbursables, it is not relevant to decision making or performance analysis--although capital asset costs are.

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## I. INTRODUCTION

### A. BACKGROUND

In 1950, with passage of the Budget and Accounting Act, the Comptroller General was authorized to conduct a continuous program for the improvement of accounting and financial reporting. In carrying out this program, the Comptroller General had three specific duties [Ref. 1: pp. 12, 13]:

1. To prescribe the principles, standards, and related requirements for each executive agency.
2. To cooperate with these agencies in the development of their accounting systems.
3. To review these systems periodically.

In 1935 the Second Hoover Commission urged that several technical improvements be instituted in the Federal Government's accounting systems. These consisted of both accrual and cost accounting, as well as property accounting [Ref. 1: p. 17]. The Commission also made the recommendation, with respect to the accounting organization, that there be an assistant director for accounting to

Develop and promulgate an overall directive for accounting and reporting within the standards prescribed by the Government Accounting Office and to stimulate the development of competent accounting... staffs throughout the government [Ref. 2: p. 139].

A year after the Hoover Reports were published, some of the basic elements were enacted in law (Public Law 863).



That law prescribed the accrual basis of accounting in accordance with the principles and standards prescribed by the Comptroller General. In addition, cost based budgets were adopted for both internal control and as a basis for appropriation requests [Ref. 2: p. 140].

However, in 1950 the Government Accounting Office (GAO) had an internal reorganization which abolished the Accounting/Systems Division. Thus, began a decline in efforts to help agencies in developing their accounting systems. More attention was given to developing and prescribing standards for accounting systems and then reviewing them for approval or disapproval [Ref. 2: p. 158]. Title 2 of the General Accounting Office Policy and Procedures Manual for the Guidance of Federal Agencies [Ref. 3] provides the principles and standards which must be followed by each executive agency.

#### B. OBJECTIVE

During the past few years GAO has taken a firm stance in applying Title 2 requirements in approving the Department of Defense (DoD) accounting systems submitted for their review and approval. These systems have been found to be deficient in several areas, including accounting for depreciation. The purpose of this study is to evaluate the requirement of accounting for depreciation within DoD. Is it a valuable and informative tool, or is it merely the adoption of an accounting principle from the private sector that really has no equivalent application within DoD?

### C. THESIS ORGANIZATION

Chapter II will present the various definitions, concepts, and uses of depreciation accounting in the private sector. It will show that depreciation is not a precise measurement of cost, but an arbitrary allocation that is used one way for internal investment decisions and another way for external reporting.

Chapter III describes the author's methods in conducting this study. In Chapter IV, the pros and cons of accounting for depreciation in the government sector are analyzed. The opponents of accounting for depreciation base their arguments on the uselessness of such information. The proponents, on the other hand, contend that depreciation is a necessary component of full costing, which is, in turn, required for evaluation, comparisons, and full disclosure.

Chapter V discusses the GAO requirement to account for depreciation and looks at the value of such information in the contexts of reimbursables, management control and evaluation, self-constructed assets, and a Federal balance sheet.

Finally, Chapter VI will conclude that, with the possible exception of accounting for reimbursables, depreciation appears to be of little informational value. There are significant differences between certain segments of the public sector and the private sector. These differences may cause one to question whether accounting systems for both

sectors should be identical. It is the author's conclusion that, unless the system provides valid information for management control purposes at some level, it should not be incorporated within DoD accounting systems.

## II. DEPRECIATION IN THE PRIVATE SECTOR

### A. TECHNICAL MEANINGS OF DEPRECIATION

Prior to any discussion of depreciation theory, a common understanding of the term must first be established. Currently, there is a variety of technical meanings that have been attached to depreciation; and these are often used as if they were interchangeable, even though they are variants of three basic concepts [Ref. 4: p. 11]:

1. The decrease in value of an asset over a specific period of time.
2. The impaired functional efficiency of an asset over time.
3. The amortization of the cost of an asset over its useful life.

#### 1. Decrease in Value

The first concept, and by far the most familiar in common conversation, defines depreciation as the measurement of that amount by which the value of an asset declines through periods of time, regardless of what combination of causes are responsible for the value change. While it appears to be a straightforward definition, the term "value" is itself somewhat ambiguous, in that it can refer to either the monetary value placed upon the asset by external forces--such as the secondhand market or an independent appraisal--or the intrinsic value that the

owner places upon the asset. The two will seldom coincide [Ref. 4: p. 11].

In the latter case, the intrinsic value of a capital asset can be measured by discounting the expected cash flows to be gained from the asset at the appropriate cost of capital. The decline in the discounted expected cash flows from one period to the next can then be charged as depreciation [Ref. 5: p. 373]. One disadvantage in computing depreciation on the basis of discounted cash flows is that it is static in nature. That is, the cost of capital at the date of acquisition as well as the timing and estimated amount of cash flows are assumed to be known over the life of the asset. Another disadvantage is that the original cost of the asset may well be less than the discounted service potential of the asset. Reporting such a gain at the date of acquisition would be of doubtful relevance to users of the financial reports [Ref. 5: pp. 374, 375].

Utilizing the decrease in resale at the end of each accounting period has the advantage of avoiding allocations based upon subjective expectation. However, in the case of a nonvendible asset, the entire asset would have to be written off on the date of acquisition or over a period of time. Allocation is, therefore, not avoided. [Ref. 5: p. 375]

## 2. Impaired Functional Efficiency

All assets have limited economic lives for two main reasons. The first is due to wear and tear in the production process, as well as to the action of the elements over time. The second reason for limited life is obsolescence. That is, technological developments occur and make the cost of operating a given asset uneconomical; or the product or service which the asset is designed to produce is no longer required [Ref. 6: p. 143]. The term depreciation is often used to refer only to the former--wear and tear. This concept implies that depreciation is the measure of the amount by which the productivity of an asset decreases through time because of physical deterioration only. It should be noted that this is not a value concept. An asset can be practically without market value, even though it has suffered no significant wear and tear and is fairly new [Ref. 4: p. 13].

## 3. Amortization of Cost

Current accounting for depreciation is based upon the cost amortization concept. As defined in the Report of the Committee on Terminology of the American Institute of Accountants [Ref. 7]:

Depreciation accounting is a system of accounting which aims to distribute the cost or other basic value of tangible capital assets, less salvage value (if any) over the estimated useful life of the unit (which may be a group of assets) in a systematic and rational manner. It is a process of allocation, not valuation. Depreciation for the year is the portion of the total change under such a system that is allocated to the

year. Although the allocation may properly take into account occurrences during the year, it is not intended to be a measurement of the effect of all such occurrences.

This definition basically states that, just as expenditures on wages or raw materials are costs of production to be subtracted from revenues in determining profit, so are the costs of capital assets. The only difference is that capital expenditures result in the acquisition of assets that yield services to a firm over a period of years [Ref. 6: p. 149]. In effect, the cost of a capital asset is a prepaid operating expense, to be apportioned over the years of its life by some systematic procedure [Ref. 4: p. 12] to match the cost of using the asset with revenues reported in each period [Ref. 5: p. 368].

In view of the fact that this thesis deals with the potential use and users of depreciation from the accountant's viewpoint, the cost amortization concept of depreciation will generally be used. When it appears necessary to deviate from this policy, the concept under discussion will be clearly defined.

## B. DEPRECIATION CONCEPTS IN THE PRIVATE SECTOR

It has always been difficult to estimate the exact economic life of a capital asset. In light of today's technological advancements, especially with the tremendous influx of multinational competition due to decreasing trade barriers, obsolescence has become the major unknown factor in determining depreciation charges, eclipsing the more

traditional concept of deterioration from wear and tear. Obsolescence can occur because of technological developments which make the cost of operating a particular capital asset uneconomical, or it can occur when there is a downward shift in the demand for a product the asset is used to produce [Ref. 6: p. 143]. The latter cause has been amply demonstrated lately, with the closing of relatively new plants, especially in the automotive industry.

In accounting, depreciation is an attempt to distribute the cost of a capital asset over its estimated useful life in a systematic and rational manner that best matches costs with revenues. This poses the question of how the useful life of an asset is to be estimated and how the apportionment should be made.

The estimate of economic life is just that--the best estimate based upon the relevant data available. Even though there are mortality tables available for many types of assets as well as sophisticated statistical methods for determining life estimates, the probability of early obsolescence is more difficult to anticipate [Ref. 5: p. 388]. Even with a fairly accurate life expectancy and salvage value, however, there is no one right method for distributing the difference between the original cost and salvage value among the years of useful life. While several methods for making this allocation have been



developed and many different criteria have been proposed, no one standard has been established [Ref. 4: p. 40]. Usually, one of the following established depreciation methods is selected by a private firm:

1. Straight-line depreciation. The straight-line method of depreciation allocates an equal portion of the acquisition cost, less estimated residual value, to each period during the useful life of the asset. This method is based upon the assumption that depreciation is a function of time rather than use [Ref. 5: p. 389].

2. Variable charge method. The variable charge method is based upon the assumption that depreciation is a function of use rather than time. This method allocates a portion of the acquisition cost to each period based upon some measurable unit of use, such as miles for a vehicle [Ref. 8: p. 362].

3. Accelerated depreciation. Accelerated depreciation allocates a substantial portion of the acquisition cost to the early years of the asset's life and correspondingly lesser amounts in later years. This method is based upon the assumption that a fixed asset is more efficient in generating revenue in the earlier years than in the later years of its life [Ref. 8: p. 363].

The cost of an asset is a real cost that, in the aggregate, must be recovered while generating a required return on investment; or else the business will ultimately

fail. Nearly all business decisions called for by the decline in value of assets may be classified as follows [Ref. 9: p. 15]:

1. Maintaining the capital base.
2. Determining the price of a product or service.
3. Analysis of investment securities.
4. Investment decisions.

1. Maintaining the Capital Base Intact

Good business practice requires that the owners of a business must determine what portion of revenues is simply a recovery of invested capital and cannot be distributed if the firm is to maintain its capital base. In current accounting practice, the operational meaning of capital maintenance is to maintain the original money value of the invested capital. In the case of a capital asset, this means that annual depreciation charges should be deducted from profits during the life of the asset so that their sum will be equal to the original cost, less salvage value, of the asset [Ref. 9: p. 20].

But what is meant by capital? It can be defined in terms of the current monetary unit or a monetary unit of constant value; in physical terms; or in terms of expectations regarding future flows to stockholders [Ref. 5: p. 143]. For instance, in periods of increasing price levels, basing depreciation charges on the historical cost of an asset leads to an erosion of the real capital base because

of the corresponding decrease in purchasing power [Ref. 9: p. 21].

## 2. Depreciation and Pricing Policy

In discussing the role of depreciation in establishing prices, the environment in which the firm operates must be taken into consideration. In a competitive market, firms do not have the leeway to establish their own process without regard to the market prices for their products. Since the basic consideration in pricing is the market, capital budgeting decisions then indicate whether and how a firm should compete in that market. For example, if additional assets were required to enter into or remain in a market, a capital budget determination would be made to decide if the current and potential prices would provide sufficient cash flows to justify the acquisition of the assets. On the other hand, if the assets were already available, a capital budgeting decision would be made in order to decide whether or not it would be worthwhile to continue operations. In neither case is depreciation used in determining a price [Ref. 4: p. 313].

The proper charge for depreciation for those firms that are allowed to price on the basis of full costs is inherently troublesome unless a stipulation as to how depreciation expense, as an element of cost, is to be determined is agreed upon by all parties [Ref. 4: p. 316]. For example, assume that a contractor invests in a capital

asset in order to fulfill a cost-plus contract and that the economic life of the asset is much greater than that of the contract. Also, at the termination of the contract, the contractor plans to sell the asset in the secondhand market. If an accelerated method of depreciation is used and the market value is much greater than the book value at the end of the contract, the contractor will have charged too much. On the other hand, if a straight line method is utilized, the book value may be substantially higher than the market value, and full cost will not have been recovered. Either circumstance would prove unsatisfactory to one of the parties. The ideal situation would be where depreciation cost matched revenue. But, as will be discussed later, this ideal is impossible to apply in practice.

### 3. Analysis of Investment Securities

Investors and creditors are assumed to be the most important users of external financial information [Ref. 5: p. 122], and the formal financial statements of a firm are directed primarily to external users [Ref. 5: p. 155]. Financial statements prepared on the accrual basis are accepted as providing useful measures of a firm's performance and relevant information for predicting potential growth in the value of the firm's stock and in dividend payments [Ref. 5: p. 157]. It is believed that reported earnings per share and projected earnings per share have a direct impact upon the market price of common shares

[Ref. 5: p. 157]. Since the main emphasis of the depreciation process is in the calculation of a periodic charge to be allocated to expense to be matched with the revenues reported in each period, it has a direct bearing on reported income and earnings per share.

A serious problem with depreciation is that no one allocation method is fully defensible. Due to the difficulty in estimating the economic life and salvage value of an asset, the assumption that the estimates remain constant over time, and the interaction of assets in the production process, it is possible that no allocation procedure is truly relevant for income reporting. In addition, the valuations shown on the balance sheet for durable assets may have no value except, possibly, for the consideration of the amount to be allocated to future periods [Ref. 5: p. 368].

Since managers react to what they consider to be the behavior of investors to reported income, they may choose available accounting procedures to report income that will create the greatest demand for their stock. For example, many firms believe that the price of their shares will be maximized if the reported net income grows at a constant rate each year. Thus, managers may choose a form of depreciation for external reports that tends to smooth out reported income [Ref. 5: p. 156].

Hendriksen [Ref. 5] concluded in his discussion of depreciation:

that the allocation of cost or other basis of long-term assets is either arbitrary or it is based on unmeasurable variables [p. 396].

if all allocation methods are arbitrary and do not result in measurements that can be defended within reasonable limits, depreciation should be abandoned, and alternative reporting methods should be substituted [p. 369].

#### 4. Investment Decisions

The awareness on the part of the government that depreciation is a useful device for achieving various policy objectives through tax laws has made most other consideration of depreciation irrelevant for financial planning [Ref. 6: p. 143].

Most students of accounting history trace current commercial practices for periodic depreciation charges to the allowability of such charges as expenses for income tax purposes beginning with 1909 [Ref. 10: p. 3].

Many managers do not understand that depreciation is not a cost of production and that its only correct use in replacement decisions is consideration of its effect as a tax shield [Ref. 11: p. 13].

In financial accounting, the primary criterion for selection of a depreciation method is the best possible matching of costs with revenue. In capital budgeting, this criterion is totally irrelevant. The only way depreciation is relevant to an investment decision is through its tax effect. Hence, the criterion for selection of a depreciation method to be used for income tax purposes in connection with a proposed new asset is maximization of the present value of the asset's depreciation tax shield [Ref. 12: p. 415].

The preceding statements indicate that, regardless of the underlying theories of depreciation, the overriding concern to the internal financial management decision making process is its effect upon future cash flows due to the tax shield.

### III. RESEARCH METHODS

#### A. LITERATURE REVIEW

Research for this study was accomplished primarily by means of a literature search and personal interviews. Documents, such as DoD and Department of the Navy (DoN) memorandums, studies and reports, were obtained from both DoD and Headquarters, Marine Corps (HQMC). The primary source of background information on depreciation concepts for both the private sector and the government sector was obtained from literature on the subject.

#### B. INTERVIEWS

In order to gain insight into perceptions of the use of depreciation accounting within the defense establishment, interviews were conducted. The individuals interviewed were Ken Ecklin, Project Manager for all Navy Accounting Systems, GAO; Ken Mulcaha and David Suing, Office of the Assistant Secretary of Defense (OSD) (Comptroller); Bill Marshal, Executive Assistant Comptroller, Navy Accounting Systems, DoN; and Gene Regan, Director, Fiscal Department-Accounting, HQMC.

A broad guideline for discussion topics was prepared by the author prior to the interviews. Topics addressed include the following:

1. What, if any, informational needs will be fulfilled by accounting for depreciation within the Department of Defense?

2. In what manner will depreciation prove to be beneficial?

3. Who will use this information?

4. What specific gain will be derived from depreciating military hardware?

This guideline allowed for a general discussion of the interviewee's opinion on the need for depreciation and allowed the author to interject more specific questions based upon his responses. For instance, if the interviewee was opposed to depreciation, it was obvious that, in his opinion, there was no valid requirement to include it in the accounting records. Therefore, instead of following the line of questioning above, the author brought up the responses to these questions of those previously interviewed who favored accounting for depreciation.

The interviewees basically broke down into two groups--those that favored depreciation and those that opposed it. The individuals interviewed at GAO and OSD favored it. In fact, their arguments favoring depreciation were similar. They both responded that depreciation was a necessary component of full costs. Full cost, in turn, was considered necessary to evaluate management performance, to determine the total cost of government programs and



functions, to make cost comparisons between similar activities and programs, and for full disclosure of government operations and functions through a Federal Government balance sheet.

Both the GAO and OSD interviewees stated that depreciation information would be of little value to units below the headquarters level. In fact, they concluded that, even at headquarters level, depreciation would provide little useful information. The main users of this information would be GAO, DoD, the Office of Management and Budget (OMB), and Congress. When asked how this information would be used by these offices, the circle was completed with the response that it would provide information on the full costs of government operations and functions. That is, full cost information is required for evaluation, planning and control. The validity of the need to include depreciation as an element of full costs is thoroughly discussed in Chapter V.

One point on which GAO and OSD did not agree on was the need to depreciate military hardware. The individuals in OSD thought that it was necessary to depreciate these assets. They stated that this would provide a true picture of the age and combat readiness of the armed forces. In addition, it would facilitate financial planning by providing information useful in determining expenditures required in subsequent years to maintain a given level of operations. The strength of these arguments are discussed in detail in

Chapter V. GAO was candid enough to admit that this was one area that required further investigation, that the usefulness of depreciating readiness material was not readily apparent.

Those interviewed at DON and HQMC, on the other hand, were generally opposed to accounting for depreciation. The one exception was in the area of reimbursable sales, where the costs of services are to be recovered from the customer. Both concurred with the idea of including depreciation as a cost to be recovered and set aside in the Industrial Fund for future replacement needs. This aspect of depreciation is discussed in full in Chapter V. Apart from that one point, however, they were doubtful of the usefulness of accounting for depreciation. The individual interviewed at DoN had just been recruited from the private sector and was extremely wary of the benefits that were claimed to be associated with depreciation. He stated that depreciation was used in the private sector to get the maximum benefit from the tax shield. When questioned about the need for depreciation as an element of full costs for evaluative purposes, he responded that depreciation was merely an arbitrary method of allocation that in no way reflected reality and, therefore, would be of limited informational use to management.

At HQMC, the interviewee contended that depreciation of fixed assets could not be associated with evaluative or

comparative measurements because of the inability of anyone to determine benefits to be received from the use of such assets. He stated that the requirement to account for depreciation was just another step in making the military more of a business enterprise than a combat force. He did not argue against financial responsibility as a necessary requirement for the defense establishment, just against the principle of incorporating accounting concepts from the private sector as surrogates for the need to establish valid accounting standards and principles for the operations and objectives of the Federal Government. This position was in direct conflict with that of the individuals interviewed at OSD. They stated that DoD should incorporate as many of the accounting procedures from the private sector as practical.

The opposing viewpoints on the subject of depreciation encountered during the interviews by the author are typical of the controversy surrounding the use or nonuse of depreciation in the government sector--as will be seen in the next chapter.

#### IV. DEPRECIATION IN THE GOVERNMENT SECTOR

##### A. CONTROVERSY

Few subjects generate more controversy or polarization than the use or nonuse of depreciation in nonbusiness accounting [Ref. 13: p. 135]. Witness:

Depreciation is not information that is in any manner relevant to the management process. With capital assets, the cost to consider is the initial acquisition or construction cost. Once that is incurred, the capital cost is a sunk cost and the amount, or lack of, depreciation does not affect costs the manager or taxpayer should be considering [Ref. 14: p. 25].

Depreciation accounting provides managers (and taxpayers, and other as well) with relevant information on the total resources availability and the total utilization of resources (using appropriate measurement methods). In this connection...an informed estimate of the periodic expiration of fixed assets costs is much more objective and useful information about resource use than merely "expensing" fixed assets at acquisition [Ref. 15: p. 109].

Prior to discussing the pros and cons of governmental depreciation, however, a distinction must be made between those operations that obtain their financial resources from revenues realized by selling goods or rendering services and those that obtain their resources exclusively from tax revenues and government borrowing. The former are often viewed as being basically comparable to the private sector for purposes of accounting. It is in the latter that most of the accounting problems, including the controversy over depreciation, occur [Ref. 13: p. 10].

Unless otherwise specified, the following sections will relate exclusively to those Federal governmental functions and operations that rely entirely upon appropriated funds for their resources.

## B. PROS AND CONS OF DEPRECIATION IN THE GOVERNMENT SECTOR

### 1. Opponents

The basic arguments against accounting for depreciation in the government sector revolve around the question of use (or misuse) of such information [Ref. 13: p. 141]. Since the main function of government is to maintain or increase the social welfare of the nation, it is required to utilize funds for nonproductive and/or unmeasurable goals for the general "good" of society [Ref. 16: p. 178]. That is, government functions are not concerned with generating revenues through their normal operations. Instead, the government raises revenues through its power to levy and collect taxes and its ability to borrow in order to cover necessary expenditures for the next fiscal year. Critics maintain that the natural focus of attention in accounting for these operations should be, therefore, the relation of total expenditures to revenues [Ref. 17: p. 17].

Those that oppose depreciation contend that it is inconsistent with the principles of fund accounting. They argue that the government has both an operating appropriation and a capital appropriation. To include depreciation

as a periodic operating expense would lead to "double-counting" and, if depreciation were not funded, would inevitably indicate a deficit [Ref. 13: p. 141]. If depreciation were to be matched with cash set aside from current revenues, the system would avoid the appearance of a budget deficit and would conserve the capital base for future generations. However, it would place a double burden on current taxpayers: first as an expenditure at the time of acquisition and then as a periodic deposit to a sinking fund over the life of the asset [Ref. 15: p. 102]. In addition, such a practice could possibly result in some loss of legislative control over future investment decisions [ref. 15: p. 104], a politically unlikely situation.

Opponents of governmental depreciation accounting conclude that, unless funds are set aside to match depreciation as it is expensed, it serves no useful purpose. For instance, since the government is not concerned with profit or loss, depreciation is not required for income determination [Ref. 18]. In fact, they argue, since government fixed assets do not produce tax or other general revenues, charging current operations with depreciation has the effect of deducting from revenues a cost to which they bear no significant relationship. Such a practice would violate the principle of matching costs with the relevant revenues [Ref. 19: p. 126].

The securities of the Federal Government are a risk free investment. It is not necessary, therefore, to show the current values of assets as adjusted for depreciation as a basis for credit [Ref. 18]. Furthermore, since the government does not sell goods or services in its normal operations, depreciation, as an element of pricing, is totally irrelevant [Ref. 17: p. 18]. In addition, the Federal Government does not pay taxes; thus, the use of depreciation as a tax shield is not applicable to the investment decisions of government managers. Opponents argue further that, since depreciation is no more than an arbitrary method of cost allocation, the validity of such information would be questionable and, therefore, of limited use [Ref. 13: p. 143].

## 2. Proponents

Proponents, on the other hand, view the recognition of depreciation as an application of the "matching principle" and "accrual accounting," which many accountants consider as self-evident truths in the communication of accounting information to the users, both internally and externally [Ref. 15: pp. 108, 109].

That is, depreciation applies to all activities using durable assets; it is an application of the matching principle that applies not only to the matching of cost with related revenues but also to the matching of cost with related nonfinancial benefits. By allocating the cost of depreciation to the period in which the benefits are

derived, a clearer picture of the full costs of a program is presented [Ref. 15: p. 104].

Depreciation expense, proponents argue, is a necessary element for the development of cost accounting; an accounting system which can be used to determine the effectiveness, efficiency, and economy of operations. The failure to recognize the full cost, including the consumption of durable assets, could result in misleading management in planning and controlling the least-cost combination of resources [Ref. 15: p. 109].

Advocates further argue that governmental external financial reports should provide full disclosure, which includes disclosing information about the consumption of fixed resources to management, taxpayers, and others interested in the financial condition and results of government operations [Ref. 15: p. 109]. Proponents contend that such information about durable assets can help in timing expenditures required each year to maintain a given level of operations over a long period and that sufficient lead time can be made available to prevent replacement from becoming a crisis. [Ref. 20: p. 3-3].

In addition, proponents argue that full costing (to include depreciation) is necessary for comparative study purposes [Ref. 15: p. 103]. For example, in comparing two similar programs, failing to include depreciation as a periodic cost might make it appear that the program which



was using more expensive capital assets and less current resources is the cheaper of the two, when in fact, this is not the case [Ref. 20: pp. 3-7].

### 3. The Opposing Views

Those that oppose depreciation accounting in the government and those that favor it appear to base their arguments upon two separate accounting concepts. Opponents contend that expenditures, not expenses, are measured in government fund accounting. Thus, to

record depreciation expense in governmental funds would inappropriately mix two fundamentally different measurements, expenses and expenditures. Depreciation expense is neither a source nor use of governmental fund financial resources, and this is not properly recorded in the accounts of such funds [Ref. 21: p. 22].

Proponents, however, counter that the

argument against the recognition of depreciation as expense in a nonprofit institution confuses the functions of accounting with the exigencies of finance. The source of funds is no criterion as to the method of accounting to be employed for the assets thus brought into the fund [Ref. 22].

That is, the controversy is an extension of the more basic controversy over the expense versus the expenditure basis of accounting [Ref. 13: p. 135].

Opponents argue that there would be no gain from recording depreciation--that, in those few cases where depreciation might be required, cost finding techniques could be employed to provide acceptable results at significantly less cost and paperwork [Ref. 23: p. 6].

Proponents, on the other hand, appear to view accounting for depreciation as necessary for government efficiency and effectiveness through full disclosure of the total cost of government operations.

#### C. THE GOVERNMENT'S VIEW

The U.S. General Accounting Office (GAO) has stated that

Accounting for depreciation as a cost is an integral part of the accrual basis of accounting. The purpose of accounting for depreciation (or amortization of cost) of long-lived capital assets is to systematically allocate their cost over the period of their estimated usefulness or capacity to render service so that all significant cost will be included in total costs of performance reported to management officials, the Congress, and the public. Although depreciation is not represented by current expenditures of funds and although there is no precise way to arrive at an accurate measure of depreciation as a current cost, it is nonetheless a real cost [Ref. 24: pp. 2-35].

Thus, GAO apparently accepts the necessity of accounting for depreciation within the Federal Government. This stance is somewhat modified, however, with the realization by GAO that a uniform requirement to record depreciation cannot be justified, because the government's activities are so varied. Instead, depreciation accounting is to be used "whenever the need arises" [Ref. 24: pp. 2-35].

## V. DEPRECIATION IN THE DEPARTMENT OF DEFENSE

### A. WHENEVER THE NEED ARISES

GAO requires that

Procedures shall be adopted by each agency to account for depreciation (or amortization of cost) of capital assets whenever need arises for a periodic determination of the cost of all resources consumed in performing services [Ref. 24: pp. 2-35].

Stated examples of need are: determining the financial results of operations in terms of revenues earned and costs incurred; collecting reimbursement for services performed; assisting management in making cost comparisons, evaluating performance, and devising future plans; and determining the cost of property constructed to determine the amount to be capitalized [Ref. 23: p. 6].

#### 1. Determining Financial Results of Operations

Even though military defense is a collective good of the most fundamental type [Ref. 25: p. 57], certain internal functions, such as commissary and exchange sales, do generate revenues. With the exception of reimbursables, this aspect of the Department of Defense is considered to be a peripheral service and outside the scope of this study.

#### 2. Reimbursements

The concept of accounting for depreciation has long been advocated for reimbursable activities.

It is a well established principle of governmental accounting that depreciation should not be provided except with reference to industrial--or commercial--type activities [Ref. 26: p. 1].

Currently, such activities keep accounts much like private businesses. In the government's industrial funds, for example, costs are billed to customers on the basis of accounts that provide detailed records of both direct and indirect costs. [Ref. 27: p. H-1]. Capital assets are currently depreciated statistically, with no charge to DoD customers [Ref. 27: p. H-17]. Beginning in Fiscal Year 1983, however, depreciation will be included in the costs to be reimbursed by the customer and set aside in the Industrial Fund for replacement requirements [Ref. 28].

While this new practice should allow greater flexibility for managers of the industrial and commercial activities by bypassing the appropriations procedure for asset acquisitions, there is still the problem of increased replacement costs. That is, if fund requirements for capital expenditures outrun funds provided by depreciation charges, additional appropriations will be required [Ref. 26: p. 4]. If depreciation were to be based upon replacement cost, this would not be a problem. However, estimating the replacement cost of the asset being valued is an expensive, complex, and subjective process [Ref. 20: pp. 3-6]. GAO, on the other hand, is stressing the importance of simple procedures for depreciation accounting.

Since the unadjusted historical cost is the easiest to determine and the most objective measure for depreciation, it will be the base most likely used [Ref. 20: pp. 3-15].

In addition, industrial activities rely indirectly upon Congress to provide funds to their customers [Ref. 27: p. H-6]. This could prove to be detrimental to both the customer and the industrial activity since the budgeting process is biased in favor of procurement rather than operation and maintenance (O&M) appropriations [Ref. 29: p. 31]. That is, the industrial activities might find that it was easier to get procurement funds for replacement needs through the appropriation process rather than having to rely upon customers who may have been underfunded.

O&M funds are a favorite Congressional target since they offer immediate, large savings from the defense budget. For example, if every procurement program costing \$500 million or more were killed in Fiscal Year 1982, it would save \$49 billion in obligational authority over the next three years, but only \$6.5 billion in outlays next year. This situation leads to the temptation to reduce readiness by cutting funds for maintenance, munitions, and manpower to achieve the quick results that are usually demanded [Ref. 30: p. 22].

If the increased charges levied by the industrial activities due to depreciation are nominal or if O&M funds are provided to match the increased charges, there should

be no fundamental change in military readiness. If, on the other hand, the incremental cost increase due to depreciation is significant and O&M funds are not increased, readiness could be sacrificed through deferred maintenance.

### 3. Management Control and Evaluation

One of the justifications for including depreciation as an element of expense is that full cost is necessary for comparative study purposes. For example, it is a policy of the Federal Government not to retain any in-house commercial or industrial type activities (CITA) for products or services that could be provided by the private sector [Ref. 31], unless [Ref. 27: p. C-35]:

1. No commercial source is available to perform the service.

2. It is in the interest of national defense to maintain the function in-house.

3. Operation of a CITA activity by a private concern would result in a higher overall cost to the government. If the first two exceptions are not applicable, a cost estimation must be undertaken in order to make the determination whether it would be more economical to retain the function in-house or contract it out [Ref. 25: p. C-35]. The cost estimation is aimed at establishing the full cost, to the maximum extent practical, of the in-house operation [Ref. 32: p. 173].

The Cost Comparison Handbook provides the standard cost factors and detailed procedures to be used to ensure an equitable comparison. The handbook requires that all in-house costs associated with the operation, both direct and indirect, be identified for the current and subsequent years of the analysis. Depreciation expense, computed on a straight-line basis, is included [Ref. 32: p. 32]. The annual costs are summed and adjusted for "other considerations." The adjusted amounts are compared to the low bid, after it has also been appropriately adjusted, and a recommendation made either to continue in-house operations or to award a contract [Ref. 32: p. 179].

A critical element in an investment decision is time, which injects the element of interest on invested capital.

The basic goal of long-term investment decision making is to maximize the wealth of the investor over the long run....In a government agency, it would logically be stated as the maximization of public benefits from the available capital resources....As capital is a scarce economic resource, it has a cost. The cost of capital is expressed as an interest rate [Ref. 14: p. 381].

Therefore, those techniques that do not recognize the time value of money are deficient and, consequently, invalid. [Ref. 12: p. 385]. Techniques that recognize the time value of money require that investment decisions be analyzed in terms of incremental flows directly attributed to them [Ref. 12: p. 383].

One of the adjustments to the in-house operation costs in the CITA evaluation attempts to take the cost of capital into consideration. For this purpose, the cost of capital is defined as

an imputed charge on the Government's investment in all of the plant facilities and other assets necessary for the work center to manufacture products or to provide services. Basically, the imputed charge...is an opportunity cost: if the capital had not been devoted to this performance during the current period, it could have been devoted to another use which would have provided other income or avoided interest expenses [Ref. 32: p. 236].

Basically, the cost of capital is computed by applying an opportunity cost of 10% to the total net book value of the assets related to the in-house operation [Ref. 32: p. 238]. The book value of fixed assets is, however, always irrelevant in making financial decisions, regardless of the technique used [Ref. 33: p. 351]. The only relevant amount upon which to base the cost of capital would be the current market value of the assets.

The problem is further complicated by the fact that durable assets that would be disposed of if the in-house operation were discontinued are valued at the current market value. (How this is accomplished for subsequent years of the analysis is not covered in the handbook instructions.) The net difference between the book value and the market value is then either added to (if a loss) or deducted from (if a gain) the outside bid price. In addition, the cost of capital, 10% of the net gain or loss, is also deducted from



or added to the bid price. [Ref. 32: p. 329]. For example, if the book value was \$500,000, a cost of capital of \$50,000 would be added to the in-house cost. If the market value was assessed at \$400,000, however, the bid price would be penalized by the \$100,000 difference in book value as well as the \$10,000 "loss" in opportunity cost if the contract was accepted.

The current procedures for CITA evaluations may not lead to the more economical choice between alternatives, since the decision is not based on the time value of the incremental cash flows. Depreciation, a noncash expense, is incorporated in the in-house costs as if it entailed a cash disbursement. In addition, the gains or losses that would occur if the assets were disposed of represent noncash differences from the book value; only the cash inflow from the sale of the assets is relevant. If a capital budget investment method were used, the cost of capital would automatically be incorporated in the computation.

The need for depreciation has also been raised as a necessary component of full cost to measure performance among similar activities. Cost comparisons between such activities may be useful in identifying those that appear to be out of line. [Ref. 34: p. 516]. An argument for including depreciation as an element of cost is that it makes comparative evaluations more equitable. For instance, in comparing two similar programs, failing to include

depreciation might make it appear that the program using more expensive capital assets and less current resources is cheaper, whether it is or not. While the inclusion of a depreciation charge may appear to offset this bias, it may actually distort the very purpose for which the comparison is made. Depreciation is a noncash expense; including it as an element of cost, however, equates it to a recurring cash outflow, without regard to time value.

For example, consider an activity which has invested in a machine that cost \$100,000. It has an estimated useful life of ten years and is able to duplicate the workload of two employees at a similar organization. All other operating costs in the two activities are equal. If the annual salary of each employee is \$7,500 and depreciation on the machine is computed on a straight-line basis (\$10,000 a year), a cost comparison between the two activities--including depreciation--would conclude that the one with the machine is the more efficient operation. However, this comparison does not take into consideration the time value of money. That is, to buy the machine would require an immediate outlay of \$100,000. The employees, on the other hand, require annual payments of \$15,000. The present value of an annuity of \$15,000 for a period of ten years at ten percent would be equal to approximately

\$92,000,<sup>1</sup> or a savings of \$8,000 compared to the \$100,000 investment in the machine.

On the other hand, this does not mean the immediate replacement of the machine by two men, either. This decision would depend on the current resale value of the machine. Suppose it has six years of remaining life. The present value of an annuity of \$15,000 for that period of time would be equivalent to \$65,300.<sup>2</sup> Thus, it would be beneficial to replace the machine with two employees only if the current resale value of the machine were greater than \$65,300.

A more valid comparison could be achieved by using an equivalent annual cost instead of a constant depreciation charge. This technique computes the annual cost that is equivalent to the present value of the total cost of an asset. It entails an annuity whose present value over the life of an asset is equal to the initial outlay for that asset. [Ref. 12: p. 421]. In the foregoing example, the equivalent annual cost over a ten year period that would equal the present value of the initial \$100,000 outlay is

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<sup>1</sup>The present value (PV) of \$1.00 for ten years at 10 percent is equal to 6.145.  $\$15,000 \times 6.145 = \$92,168$ .

<sup>2</sup>The PV of \$1.00 for six years at 10 percent is equal to 4.355.  $\$15,000 \times 4.355 = \$65,329$ .

\$16,274,<sup>3</sup> a difference of \$1,274<sup>4</sup> over the combined wages of the employees. This does not mean that there would actually be an annual expenditure of \$16,274, but simply that such an annual expense over the useful life of the asset is equivalent to the actual expenditure of \$100,000 at once [Ref. 12: p. 422].

Depreciation is considered a necessary component of full cost to measure management performance [Ref. 35]. Within the separate branches of the military, systems and the assets that support them are typically established at the headquarters level. Including depreciation for such comparisons would have little meaning and could possibly reduce the usefulness of the evaluation if acquisition or construction cost were significantly different due to different manufactured lots or other reasons. In addition, depreciation is basically a noncontrollable cost and irrelevant to the evaluation of managerial performance. [Ref. 36: p. 3-II-32].

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<sup>3</sup>The equivalent annual purchase cost is calculated by dividing the acquisition cost by the PV of \$1.00 at the desired interest over the life of the asset. In this example, the PV for a ten year annuity of \$1.00 at ten percent is equal to 6.145.  $\$100,000 / 6.145 = \$16,274$ .

<sup>4</sup>The PV of an annuity of \$1,274 at ten percent over a ten year period is approximately \$8,000. This is the same \$8,000 difference in present values of life cycle costs calculated earlier.

Another argument in favor of accounting for depreciation is that it can provide useful information for planning purposes. That is, such information can be used in determining expenditures required in subsequent years to maintain a given level of operations [Ref. 35]. While depreciation may provide a general guideline for the timing of replacement needs, it does not offer any valid cost input upon which to base replacement costs. Time alone would appear to be an equally valid indicator of replacement projections at considerably less cost and trouble [Ref. 37].

This analysis is based upon the assumption that the old assets will not be replaced until they can no longer be used in the production process for which they were procured. Efficient management, however, often requires a decision to replace an asset presently in service with a new and better one, even though the old asset's useful life has not expired. In these cases, depreciation becomes totally irrelevant. Replacement decisions should be based upon comparison of the future cash flows from the old and new assets [Ref. 12: p. 412].

#### 4. Capitalization of Constructed Property

Depreciation of assets used to construct new property is considered necessary to ensure that all costs are included in the amount capitalized for the constructed property. However, it seems burdensome to record

depreciation on durable assets used during the construction phase for this purpose only, since reliable cost data could be easily estimated by the use of statistical cost computations from a small, representative sample [Ref. 26: p. 5].

## B. OTHER CONSIDERATIONS

### 1. Federal Financial Statements

One of the stated needs for the use of depreciation is to allow preparation of government-wide financial statements on a basis consistent with that of the private sector [Ref. 35]. Such statements would provide for the full disclosure of relevant information on total resources available and total utilization of resources to both taxpayers and members of Congress [Ref. 15: p. 109]. It has been alleged that a Federal balance sheet would give a true picture of the age and readiness of the armed forces [Ref. 35]. But it would merely show a book value figure that would not accurately portray the readiness posture of the military. Indeed, no financial value for military hardware would be a relevant measure of its defense or deterrent capability. Combat readiness reports on the ability of military hardware to go into combat would provide a much more realistic gauge of overall readiness than a list of assets at depreciated book values or any other financial value [Ref. 37].

If a Federal balance sheet is desirable, depreciation has to be incorporated into the accounting structure.

However, balance sheets in the private sector are used for investment analysis purposes, such as determining debt/equity ratios, return on assets, and so on. There is no equivalent need for such an analysis in the Federal Government. What informational needs would a Federal balance sheet fulfill? A cost-benefit analysis would probably reveal that the cost of providing such information far outweigh the benefits to be received [Ref. 23: p. 6].

The main emphasis of the depreciation process for external reports in the private sector is in the business of generating social benefits, not income. Even if outputs could be measured monetarily, the difference in inputs and outputs would not measure effectiveness. The problem is further complicated by the fact that the government can seldom measure effectiveness [Ref. 34: p. 516]. Furthermore, financial statements are used in the private sector by investors for predictive purposes to calculate potential earnings. There is no equivalent need for such an analysis of the Federal Government.

Proponents argue that full disclosure, based upon full cost accounting principles, will provide a clearer picture of the cost of government function. However, the taxpayers and the business community appear to be more interested in current and projected cash flows than full cost concepts. One reason could be that, because

of the deliberate and inherent biases created by the use of allocation procedures and historical transaction

prices, there is some doubt that traditional accounting methods are adequate to report the complex economic activities of today. One way of avoiding some of these biases is to emphasize the reporting of cash flows, supplemented by other information and appropriate classifications...[Ref. 5: p. 237].

## 2. Military Hardware

GAO states that all fixed assets, including military hardware, should be capitalized and included in the financial property accounting records [Ref. 20: pp. 1-6].

Advocates of depreciation accounting contend that capitalization would logically require subsequent amortization for those items having limited lives [Ref. 20: pp. 3-13]. But there is no accounting principle that states that depreciation is a necessary consequence of capitalization [Ref. 38]. In fact, a report prepared for the U.S. Army / Arthur Young & Co., concludes that depreciation of readiness material would be a completely meaningless and potentially misleading charge since such material is an end product of the defense establishment. That is, it should be considered as finished goods inventory, not as a capital asset. [Ref. 36: pp. 3-II-5, 6].



## VI. CONCLUSION

### A. SUMMARY

Chapter I introduced the requirement of government agencies to account for depreciation and raised the question of the relevance of this requirement. In studying this question, depreciation accounting concepts and uses from the private sector were examined in Chapter II. It was seen that depreciation is not a precise measurement of consumed assets, but an arbitrary and controversial concept. Nor is there any one right method for calculating depreciation for external reports. Thus, management can choose that method which presents the firm's earned income most favorably. It was also seen that, with the exception of the tax shield effect, depreciation is ignored by management for investment decisions.

Chapter III discussed the methods of research and introduced the controversy surrounding depreciation accounting in the government sector. Chapter IV looked at the pros and cons of accounting for depreciation in the government sector. Opponents contend that, unless a fund is set aside for depreciation, it serves no useful purpose. Proponents, on the other hand, argue that depreciation is a necessary element of full costing which is, in turn, required for evaluative and comparative purposes as well

as for the full disclosure of the cost of government operations.

Chapter V analyzed the specific requirements of GAO as to when to account for depreciation. This final chapter will present the author's conclusions and recommendations.

#### B. CONCLUSION

The basic argument in favor of accounting for depreciation in the government revolves around the concept of full costs. Full costs are deemed necessary for evaluative and comparative purposes to ensure the most efficient and effective use of resources. In addition, depreciation is considered to be a necessary element for the full disclosure of the costs of government operations and functions. The implication is that depreciation is an accurate measure of the cost of consumption of durable assets used during the production process. This implication is not necessarily correct, however. Depreciation is an arbitrary allocation of a past, or sunk, cost.

In the private sector the acquisition cost has to be recovered in order to avert an erosion of the original money value of the capital base. This is accomplished by the use of depreciation charge as a current expense to be deducted from revenue in determining earned income. The Federal Government, however, raises revenues through taxation and borrowing, not through the sale of goods and services. Thus, the concept of income is not relevant.

Investment decisions in the private sector are based upon expected future cash flows. Depreciation's only role in the investment decision is in its tax shield effect. Since taxes are irrelevant in government investment decisions, depreciation is likewise irrelevant in such decisions.

Once the decision has been made to acquire a capital asset, the funds have been committed and are foregone. That is, depreciation is a noncontrollable expense and should not be considered a relevant factor for evaluation purposes. Since investment decisions are based upon expected future cash flows, a better performance evaluator might be to assess whether or not the projected cash flows have been realized. Depreciation is a poor surrogate for such a measure.

For comparative purposes, depreciation is used as an equalizer. This use, however, treats depreciation as a current cash expense, while ignoring the time value of money. Thus, instead of providing a clearer picture of the performance of two similar activities, depreciation can actually distort such an analysis. A more equitable comparison would be achieved by using the equivalent annual cost based upon the cost of capital.

Full disclosure of costs appears to be a reasonable need at first. But such information should have a particular value that offsets its cost. If a Federal balance sheet

was to be considered desirable, the recording of depreciation would be required. But of what informational value would it be? It would not provide information about the readiness, effectiveness, or efficiency of the military. Nor would it be of use for investment analyses, since government securities are considered to be risk-free investments. While a balance sheet would supply information about the government's debt/equity ratio, this information would be of little worth, since it does not reflect the solvency of the Federal Government. Nor is there any sense in trying to determine the rate of return on governmental assets, since social benefits cannot be measured in monetary terms.

Accounting for depreciation in the Federal Government appears to be of little informational value. Accounting in the private sector is far from being an exact science. Even if it were devoid of controversy, the objectives of the Federal Government and private firms are sufficiently different to require separate accounting principles and standards. If certain principles can meet the needs of government objectives, they should be incorporated. With the exception of reimbursements, the requirement to account for depreciation does not appear to fit into this category. Those that advocate the need to adopt techniques from the private sector should bear the burden of proving that the

benefits to be derived outweigh the cost of incorporating those techniques.

C. RECOMMENDATION

It is recommended that GAO review the requirement to account for depreciation within DoD from the aspect of whether the benefits that are expected to be generated both meet the basic objectives of governmental accounting concepts and are cost effective. If not, the requirement should be eliminated.

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